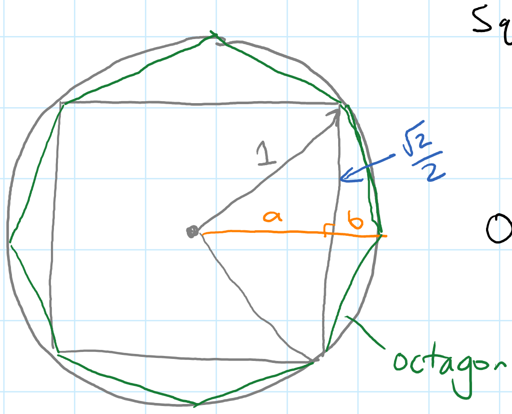
Math 242 A — 11 February 2022



circumference: 2π

Square: 2^2-gon

side length: $s_2 = \sqrt{2}$ $\quad \pi_2^i = \frac{4 s_2}{2} = 2 s_2 = 2\sqrt{2}$

$\approx 2.282\ldots$

Octagon: 2^3-gon

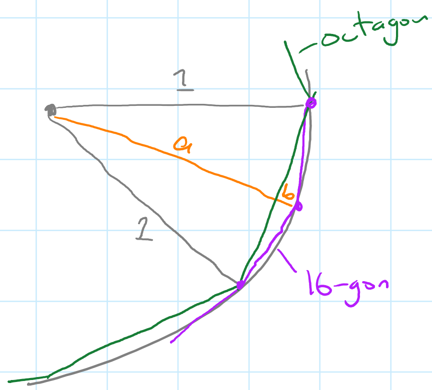
$$a = \sqrt{1 - \left(\frac{s_2}{2}\right)^2} = \sqrt{1 - \left(\frac{\sqrt{2}}{2}\right)^2} = \cdots = \frac{1}{\sqrt{2}}$$

$$b = 1 - a$$

side length: $s_3 = \sqrt{b^2 + \left(\frac{s_2}{2}\right)^2} = \sqrt{\left(1 - \frac{1}{\sqrt{2}}\right)^2 + \left(\frac{\sqrt{2}}{2}\right)^2}$

$$s_3 = \sqrt{2 - \sqrt{2}}$$

π: $\quad \pi_3^i = \frac{8 s_3}{2} = 4\sqrt{2 - \sqrt{2}} \approx 3.061\ldots$



16-gon: 2^4-gon

$$a = \sqrt{1 - \left(\frac{s_3}{2}\right)^2} = \frac{1}{2}\sqrt{2 + \sqrt{2}}$$

$$b = 1 - a$$

side length: $s_4 = \sqrt{b^2 + \left(\frac{s_3}{2}\right)^2} = \sqrt{2 - \sqrt{2 + \sqrt{2}}}$

π: $\quad \pi_4^i = \frac{16 s_4}{2} = 8\sqrt{2 - \sqrt{2 + \sqrt{2}}} \approx 3.121$